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| EXAMINER | |
|---|---|
| ODOM, CURTIS B | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2611 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/758,355 | MASENTEN, WESLEY K. | |
| | Examiner | Art Unit | |
| | Curtis B. Odom | 2611 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *05 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 4/5/2007 have been fully considered but they are not persuasive. Applicant states Richardson (U. S. Patent No. 5, 861, 637) does not disclose or suggest bandpass filters which result in "the digitized transmit signal reference having the receiver bandwidth," as recited by Claim 1 and 10 (see page 4 of the Remarks).

However, Richardson discloses canceling leakage signals in a receiver, wherein the frequency of the canceling signal has the same frequency (bandwidth) as the received downconverted IF signal (see column 4, lines 35-39), wherein the leakage cancellation signal is band-pass filtered (see column 6, lines 40-56) and upshifted (in frequency band) to the IF frequency of the received signal (see column 4, lines 59-66). Richardson further discloses the notch bandwidth (described in column 4, lines 48-57) of the canceling signal in consistent (coherent) with the bandwidth transmitted/received signal since the local oscillator signals are shared by the receiver and the transmitter (see column 6, lines 60-64). Thus, even when frequencies are drifting the canceling signal is still effective because it is coherent with the receiver bandwidth. Thus, it is the understanding of the Examiner that Richardson does in fact disclose "a digitized transmit signal reference having the receiver bandwidth".

Regarding claim 12, the Applicant states "Claim 12 includes limitations which neither Kenworthy nor Richardson disclose or suggest. For example, Applicant submits that neither Kenworthy nor Richardson discloses or suggests "the first signal having the receiver bandwidth"

and "the second signal having the receiver bandwidth" as recited by Claim 12 (see page 5 of the Remarks)."

However, Kenworthy (U. S. Patent No. 5, 691, 978) discloses a receiver (Fig. 6, block 20) having a receiver bandwidth, wherein the receiver receives a first signal from the duplexer, the first signal having the receiver bandwidth of the received, downconverted baseband signal (see column 2, lines 45-54). Richardson further discloses canceling leakage signals of a second transmission siganl in a receiver using a canceling signal, wherein the frequency of the canceling signal has the same frequency (bandwidth) as the received downconverted IF signal (see column 4, lines 35-39), wherein the leakage cancellation signal is band-pass filtered (see column 6, lines 40-56) and upshifted (in frequency band) to the IF frequency of the received signal (see column 4, lines 59-66). Richardson further discloses the notch bandwidth (described in column 4, lines 48-57) of the canceling signal in consistent (coherent) with the bandwidth of the transmitted/received signal since the local oscillator signals are shared by the receiver and the transmitter (see column 6, lines 60-64). Thus, even when frequencies are drifting the canceling signal is still effective because it is coherent with the receiver bandwidth. It also the understanding of the Examiner that since the local oscillators are shared by the receiver and the transmitter, the signals of the transmitter and receiver have the same bandwidth. Thus, it is the understanding of the Examiner that Kenworthy and Richardson do in fact disclose "the first signal having the receiver bandwidth" and "the second signal having the receiver bandwidth"

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7, 9, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenworthy (previously cited in Office Action 8/23/2005) in view of Richardson et al. (previously cited in Office Action 4/5/2007).

Regarding claim 1, Kenworthy discloses a transceiver comprising:

a receiver (Fig. 1) for receiving a signal and generating a receiver signal (Fig. 1, block 25 (receiver), column 3, lines 39-46) having a receiver bandwidth;

a receiver direct converter (Fig. 1, block 25 and Fig. 3, block 45, column 3, lines 43-52) translating the receiver signal to a baseband (downconverter) of the receiver signal and digitizing the translated, receiver signal;

an adaptive canceller (Fig. 1, block 27, and Fig. 3 column 3, line 53-column 4, line 7) comprising a reference direct converter, the reference direct converter (Fig. 3, blocks 41 and 43, column 3, line 53-column 4, line 7) outputting a digitized transmit signal reference of a spectral energy of a transmitter; and

a matched filter (Fig. 2, column 3, lines 17-34, wherein the analog canceller (filter) taps are matched to the interference in the signal) wherein the receiver direct converter, the reference direct converter, and the matched filter suppress the spectral energy of the transmitter from the receiver signal (column 3, line 17-column 4, line 8).

Kenworthy does not disclose the digitized reference transmit signal having the receiver bandwidth.

However, Richardson discloses canceling leakage signals in a receiver, wherein the frequency of the canceling signal has the same frequency (bandwidth) as the received downconverted IF signal (see column 4, lines 35-39), wherein the leakage cancellation signal is band-pass filtered (see column 6, lines 40-56) and upshifted (in frequency band) to the IF frequency of the received signal (see column 4, lines 59-66). Richardson further discloses the notch bandwidth (described in column 4, lines 48-57) of the canceling signal in consistent (coherent) with the bandwidth of the transmitted/received signal since the local oscillator signals are shared by the receiver and the transmitter (see column 6, lines 60-64). Thus, even when frequencies are drifting the canceling signal is still effective because it is coherent with the receiver bandwidth. It also the understanding of the Examiner that since the local oscillators are shared by the receiver and the transmitter, the signals of the transmitter and receiver have the same bandwidth. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the transceiver of Kenworthy to produce a leakage cancellation signal of the same frequency (band) as that of the received signal as taught by Richardson to cancel transmitter signal leakage (see Richardson et al., column 2, lines 37-45).

Regarding claim 2, Kenworthy discloses the transceiver of claim 1, wherein the transceiver is a full duplex transceiver (column 2, lines 32-34).

Regarding claim 3, Kenworthy discloses the transceiver of claim 1, further comprising a transmit and receive antenna radiator (Fig. 4, element 17).

Regarding claim 4, Kenworthy discloses the transceiver of claim 1, further comprising a transmit antenna radiator and a receive antenna radiator (Fig. 1, elements 17 and 21).

Regarding claim 5, Kenworthy discloses all the limitations of claim 5 (see rejection of claim 1), except the receiver direct converter, the reference direct converter, and the matched filter have approximately 90 dB attenuation. However, Kenworthy does disclose an example in which the receiver direct converter, the reference direct converter, and the matched filter have approximately 40 dB attenuation (column 4, lines 21-34) to cancel an undesired signal. Kenworthy also discloses that the object of the system is to attenuate the interference to a level which is low enough that the signal of interest can be adequately demodulated (column 4, lines 8-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the canceller could have been designed to have a 90 dB attenuation in order to optimize the canceller and allow the canceller to attenuate an undesired signal which requires 90 dB attenuation to allow adequate demodulation of the signal of interest.

Regarding claims 6 and 7, Kenworthy discloses all the limitations of claims 6 and 7 (see rejection of claim 1), except Kenworthy does not disclose the receiver direct converter and the reference direct converter have a sampling rate approximately equal to that of the carrier frequency of interest. However, Kenworthy discloses the signal is sampled by the receiver direct converter and the reference direct converter using A/D converters (Fig. 3, blocks 41 and 45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a sampling rate equal to a carrier frequency of interest in order to obtain an accurate reconstruction of the signal of interest for further processing.

Regarding claim 9, Kenworthy discloses the transceiver of claim 1, wherein the transceiver is adapted to cancel interference from other co-sited transmit antennas (column 2, lines 55-59).

Regarding claim 12, Kenworthy discloses a transceiver (Fig. 6) comprising:

duplexer (Fig. 6, block 171, column 4, lines 57-65) coupled to an antenna ;

a receiver (Fig. 6, block 20) having a receiver bandwidth, wherein the receiver receives a first signal from the duplexer, the first signal having the receiver bandwidth;

a transmitter (Fig. 6, block 10) sending a second signal to the duplexer, the second signal having the receiver bandwidth (column 5, lines 9-37, wherein the first signal transmitted by a first transceiver has the same frequency (bandwidth) the second signal received at the first transceiver from the second transceiver, wherein the transmitter and receiver transmit/receive signals at a predetermined frequency (bandwidth); and

an adaptive, digital, coherent spectral canceller coupled to the receiver and the transmitter, the canceller attenuating a signal spectrum leakage of the second signal within the receiver (Fig. 6, block 27, column 3, line 53-column 4, line 8).

Kenworthy does not specifically disclose the canceller attenuating a signal spectrum leakage of the second signal within the receiver bandwidth.

However, Richardson discloses canceling leakage signals in a receiver, wherein the frequency of the canceling signal has the same frequency (bandwidth) as the received

downconverted IF signal (see column 4, lines 35-39), wherein the leakage cancellation signal is band-pass filtered (see column 6, lines 40-56) and upshifted (in frequency band) to the IF frequency of the received signal (see column 4, lines 59-66). Richardson further discloses the notch bandwidth (described in column 4, lines 48-57) of the canceling signal in consistent (coherent) with the bandwidth of the transmitted/received signal since the local oscillator signals are shared by the receiver and the transmitter (see column 6, lines 60-64). Thus, even when frequencies are drifting the canceling signal is still effective because it is coherent with the receiver bandwidth. It also the understanding of the Examiner that since the local oscillators are shared by the receiver and the transmitter, the signals of the transmitter and receiver have the same bandwidth. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the transceiver of Kenworthy to produce a leakage cancellation signal of the same frequency (band) as that of the received signal as taught by Richardson to cancel transmitter signal leakage (see Richardson et al., column 2, lines 37-45).

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kenworthy (previously cited in Office Action 8/23/2005) in view of Richardson et al. (previously cited in Office Action 6/11/2007) as applied to claims 1-7, 9, and 12 above and in further view of Yedid et al. (previously cited in Office Action 8/23/2005).

Kenworthy and Richardson et al. disclose all the limitations of claim 8 (see rejection of claim 1) including an adaptive digital filter adapted to align the digitized transmit signal reference in a reference path with a transmit signal in a leakage receiver path, the adaptive filter outputting an compensated digitized transmit signal reference (see, Kenworthy, Fig. 3, block 43, column 3, line 53-column 4, line 7). Kenworthy and Richardson et al. do not disclose the filter is

an adaptive digital transversal filter adapted to align an amplitude and a phase of the digitized transmit signal reference in a reference path with a transmit signal in a leakage receiver path, the adaptive digital transversal filter outputting an compensated digitized transmit signal reference.

Yedid et al. discloses an adaptive canceller including an adaptive digital transversal filter adapted to align an amplitude and a phase (symbol values) of the digitized transmit signal reference (echo estimate signal) in a reference path with a transmit signal (received echo signal) in a leakage receiver path, the adaptive digital transversal filter outputting a compensated digitized transmit signal reference (Fig. 4, column 6, line 15-column 8, line 37). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the filter of Kenworthy and Richardson et al. with transversal filter of Yedid et al. since Yedid et al. states the transversal filter is capable of effectively tracking and compensating for non-linearities in system components that manifest themselves as added noise introduced into the received signal propagation path.

5. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dankberg et al. (previously cited in Office Action 1/26/2006) in view of Kenworthy (previously cited in Office Action 8/23/2005) and in further view of Richardson et al. (previously cited in Office Action 4/5/2007).

Regarding claim 10, Dankberg et al. discloses a method of attenuating a transmitter signal spectrum within a bandwidth of a receiver, the method comprising:

digitizing (Fig. 5, block 110) a received signal from a receiver, the received signal having a receiver bandwidth, the received signal corrupted by components of a transmit signal, wherein the receiver is implemented in a digital domain (column 3, lines 51-52);

creating (column 3, lines 59-66) a digitized reference transmit signal (source information signal) of the transmit signal,

aligning (column 4, lines 31-53) the digitized reference transmit signal in amplitude, phase, and time delay with the digitized received signal; and

subtracting (column 4, lines 18-27) the digitized reference transmit signal from the digitized received signal to form a residue (column 2, lines 46-54, additive noise/error signal).

Dankberg et al. does not disclose the digitized reference transmit signal having a receiver bandwidth or suppressing a transmitter spectral signal power of the residue within the bandwidth of the receiver.

Kenworthy discloses suppressing a transmitter spectral signal power from resulting residue (undesirable residual transmitted signal) from a prior transmitter leakage attenuation operation (Fig. 1, block 27, column 3, lines 30-58). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the method of Dankberg et al. with the teachings of Kenworthy in order to cancel the residual transmitter signal components is since Kenworthy states reducing these signal components will create a signal which can be adequately demodulated (column 4, lines 8-15).

Richardson further discloses canceling leakage signals in a receiver, wherein the frequency of the canceling signal has the same frequency (bandwidth) as the received downconverted IF signal (see column 4, lines 35-39), wherein the leakage cancellation signal is band-pass filtered (see column 6, lines 40-56) and upshifted (in frequency band) to the IF frequency of the received signal (see column 4, lines 59-66). Richardson further discloses the notch bandwidth (described in column 4, lines 48-57) of the canceling signal in consistent

(coherent) with the bandwidth of the transmitted/received signal since the local oscillator signals are shared by the receiver and the transmitter (see column 6, lines 60-64). Thus, even when frequencies are drifting the canceling signal is still effective because it is coherent with the receiver bandwidth. It also the understanding of the Examiner that since the local oscillators are shared by the receiver and the transmitter, the signals of the transmitter and receiver have the same bandwidth. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the method of Dankberg et al. and Kenworthy to produce a leakage cancellation signal of the same frequency (band) as that of the received signal as taught by Richardson to cancel transmitter signal leakage (see Richardson et al., column 2, lines 37-45).

Regarding claim 11, which inherits the limitations of claim 10, Kenworthy et al. further discloses adjusting (Fig. 3, block 43, column 3, line 53-column 2, line 7) the transmit signal based on the residue (error) determined by subtracting the digitized reference transmit signal from the digitized received signal. It would have been obvious to one of ordinary skill in the art to include this feature in order to further minimize the residue (error) and create a signal which could be adequately demodulated (column 4, lines 1-15).

## *Conclusion*

**6. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

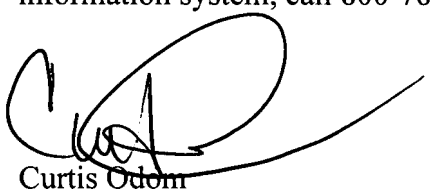
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Curtis Odom

June 11, 2007